



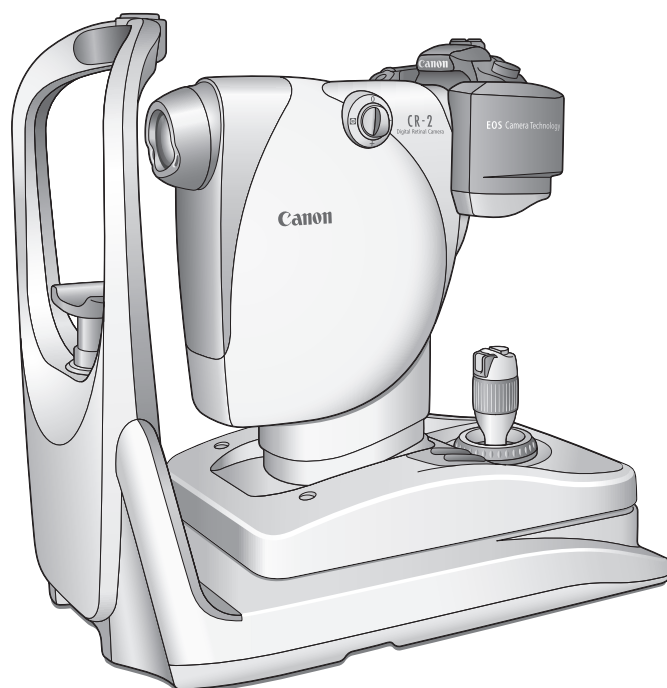
Digital Retinal Camera

# CR-2

## Operation Manual

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Make sure you read this manual before using the instrument.  
Keep this manual safely so that you can use it in the future.



Thank you for purchasing the Canon Digital Retinal Camera CR-2 (referred to as “CR-2” in this manual). The operation manuals for this instrument consist of the “Digital Retinal Camera CR-2 Operation Manual” and the “Retinal imaging control software NM 2 Operation Manual.” Be sure to read these manuals thoroughly before using the instrument, and apply the information that you learn.

## **Important**

- The CR-2 must only be used by a doctor or a legally qualified person.
- The user is responsible for managing the usage and maintenance of medical equipment. We suggest that someone be put in charge of maintenance to ensure that the CR-2 is kept in good condition and can be used safely.

## **Disclaimers**

- Canon takes no responsibility for damage that occurs due to fires, earthquakes, third party actions, other accidents, the user's deliberate misuse, negligence, experimentation, or use under other abnormal conditions.
- Canon takes no responsibility for direct or consequential damages resulting from the use or the inability to use the CR-2. In addition, no compensation is available for lost image data, regardless of the cause of the loss of the image data.
- Canon takes no responsibility for injuries or property damage that may occur if safety precautions are not followed or the instrument is used for something other than its intended purpose.
- Medical examinations are the responsibility of a doctor. Canon takes no responsibility for diagnostic results.
- Follow the laws relating to the production, processing, analysis, and storage of medical images. The user is responsible for maintaining the confidentiality of image data.
- The information in this manual may be changed without prior notice.
- Although we have made every effort to ensure the accuracy of the information in this manual, if you have any queries regarding the contents, please contact the Canon representative or distributor from whom you purchased the CR-2.

## **Installation**

- Ask the Canon representative or distributor from whom you purchased the CR-2 to install it.

## **Trademarks**

- Canon and the Canon logo are trademarks of Canon Inc.
- Other system names and product names that appear in this manual are trademarks of their respective companies.

## **Copyright**

- The copyright of this manual belongs to Canon Inc.
- Unauthorized reproduction, duplication, or reprinting of this manual in whole or in part is prohibited.

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# 1 Introduction

## Features

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The Canon Digital Retinal Camera CR-2 takes digital photographic retinal images of patient's eyes across an angle of view of 45 degrees, in a naturally dilated state without using mydriatics. The CR-2 has the following features.

### **Reduced flash intensity**

The CR-2 can take images at ISO 1600 at the standard flash intensity, and ISO 6400 in low flash intensity mode. This reduces patient discomfort caused by light glare.

### **Compact, user-friendly design**

The CR-2 is designed to be even smaller, more lightweight and compact. This makes it easier to assist patients and provides significantly improved ease-of-operation.

An integrated operation lever has been adopted for vertical movement of the main unit, switching between anterior eye and retina, and focus operations, which significantly improves alignment operability.

### **Special digital camera**

The CR-2 is equipped with a special digital camera using EOS digital technology. This enables the CR-2 to fully maximize Canon technology for shooting high-quality, high-resolution diagnostic images.

### **Small pupil photography function**

The CR-2 take retinal images through pupils of the normal diameters from 4.0 mm. When using the small pupil photography function, it can take through pupils of the diameters from 3.3 mm.

### **System optimized for digital photography**

With the Retinal imaging control software, the photographed images can be browsed, processed, stored, output to the DICOM storage server, exported in DICOM or JPEG format and output to a printer.

## Indications for Use

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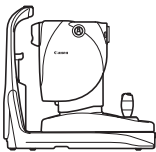
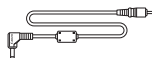
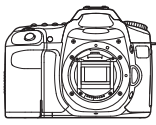







### **For U.S.A.**

The device is intended to be used for taking digital images of the retina of the human eye without a mydriatic.

### **For European Union**

This medical device is intended to observe image and record retinal fundus through the pupil without contact with subject's eye for the purpose of diagnosis by way of producing fundus image information.

## Components

<b>Digital Retinal Camera CR-2</b> Main unit		<b>Video cable</b> Use to connect an external monitor.	
<b>Digital camera</b> Digital camera specialized for the CR-2.		<b>Digital camera cover</b> Protects the cable that is connected to the digital camera.	
<b>Power cord</b> Connects the CR-2 to an AC outlet. (3 m) USA and Canada only: Plug type: VM0275 Hospital-Grade		<b>Chin rest paper</b> 100 sheets provided.	
<b>Camera mount cap</b> Initially covers the camera mount on the retinal camera.		<b>Objective lens cap</b> Initially covers the objective lens.	
<b>Dust cover</b> Use it to cover the CR-2 when it's not being used.		<b>Body cap</b> Initially covers the mount on the digital camera.	
<b>Operation Manual for the CR-2—this document</b> Describes the handling precautions and operating instructions for the CR-2.  <b>CD-ROM—Retinal imaging control software NM 2</b> Contains the Retinal imaging control software NM 2 (Rics NM 2), which is used to record, view and store photographed images taken with the CR-2.  <b>Operation Manual for the Retinal imaging control software NM 2</b> Describes the procedures for operating the Rics NM 2.  <b>DICOM Conformance Statement</b> DICOM Conformance Statement for the Rics NM 2.			

### Optional products







External eye fixation lamp

Chin rest paper—500 sheets

### Conventions Used in This Manual

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This manual uses the following symbols to indicate safety precautions that are important for using the CR-2 safely. Always follow the advice in these safety precautions.

 <b>WARNING</b>	A warning that incorrect operation may result in death or serious injury.
 <b>CAUTION</b>	A caution that incorrect operation may result in serious injury.
<b>CAUTION</b>	A caution that incorrect operation may break the CR-2 or damage other devices.
	This symbol indicates things that must not be done (prohibited actions).
	This symbol indicates things that must be done.
	This symbol indicates important advice that we strongly recommend be followed while operating the CR-2.
	This symbol indicates supplementary explanations or advice for operating the CR-2.

# 2 Safety

## Regulatory Information

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The following sections list the classifications applicable to the CR-2 and the directives and standards that the CR-2 complies with.

### Device Classification

Protection against electric shock	Class I equipment
Degree of protection against electric shock	Type B applied parts
Degree of protection against ingress of water	IPX0
Degree of safety of application in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide	Not suitable
Mode of operation	Continuous operation

### Directives and Standards

#### USA and Canada

UL 60601-1 CAN/CSA C22.2 No.601.1 IEC 60601-1: 1988/A1: 1991/A2: 1995	Medical electrical equipment – Part 1: General requirements for safety
IEC 60601-1-1 Ed. 2.0: 2000	Medical electrical equipment – Part 1-1: General requirements for safety – Collateral standard: Safety requirements for medical electrical systems
IEC 60601-1-2: Ed. 2.1: 2004	Medical electrical equipment – Part 1-2: Collateral standard: Electromagnetic compatibility – Requirements and tests
IEC 60601-1-4: Ed. 1.1: 2000	Medical electrical equipment – Part 1-4: Collateral standard: Programmable electrical medical systems
ISO 15004-1: 2006	Ophthalmic instruments – Part 1: General requirements applicable to all ophthalmic instruments
ISO 15004-2: 2007	Ophthalmic instruments – Part 2: Light hazard protection
ISO 10993-1: 2003 ISO 10993-5: 1999 ISO 10993-10: 2002/A1: 2006	Biological evaluation of medical devices – Evaluation and testing

### European Union

93/42/EEC	Medical Device Directive
EN 60601-1 Ed. 3.0: 2006	Medical electrical equipment – Part 1: General requirements for safety
EN 60601-1-2: 2007	Medical electrical equipment – Part 1-2: Collateral standard: Electromagnetic compatibility – Requirements and tests
EN 60601-1-6: 2004	Medical electrical equipment – Part 1-6: General requirements for safety – Collateral standard: Usability
IEC 62304: 2006	Medical device software – Software life-cycle processes
EN 62366: 2008	Medical device – Application of usability engineering to medical devices
EN ISO 14971: 2007	Medical device – Application of risk management to medical devices
EN ISO 15004-1: 2006	Ophthalmic instruments – Part 1: General requirements applicable to all ophthalmic instruments
EN ISO 15004-2: 2007	Ophthalmic instruments – Part 2: Light hazard protection
EN ISO 10993-1: 2003 EN ISO 10993-5: 1999 EN ISO 10993-10: 2002/A1: 2006	Biological evaluation of medical devices – Evaluation and testing

### Deutschland

Während des Betriebs liegt der Schalldruckpegel dieses Instruments bei 70 dB(A) oder weniger gemäß EN ISO 7779.



## Safety Precautions

To prevent injuries and data loss, operate the CR-2 correctly by following the safety precautions.

### WARNING



#### **Do not damage the power cord**

- Do not place anything heavy onto the power cord.
- Do not damage or modify the power cord.
- Do not forcibly bend, twist or pull the power cord.
- Do not hold the power cord when removing it from the AC outlet. Be sure to hold the plug.
- Do not use an extension cable with the power cord. Connect it directly to the AC outlet.

Handle the power cord carefully. If the cord is damaged, contact a Canon representative or distributor for a replacement. Damaged cord may result in fire or electric shock.



#### **Do not disassemble or modify**

Disassembled or modified instrument may result in fire or electric shock. Since the CR-2 incorporates high-voltage parts that may cause electric shocks, touching them may cause death or serious injury.



#### **Do not leave alcohol, thinner, or any flammable chemicals near the instrument.**

Do not place near to a flammable solvent. Fire may result if the solvent spills or evaporates and makes contact with internal electric parts. Some disinfectants are flammable. Be sure to take care when using them.



#### **Stop using immediately if there is an abnormality or problem If an abnormality occurs, immediately unplug the power plug and turn off the power of all the devices**

- Smoke is emitted
- An unusual smell
- An unusual noise
- Foreign matter gets inside
- Damaged

Fire or electric shock may result if you keep using in such condition. Immediately turn off the power of CR-2, unplug the power plug and turn off the power of all connected devices. Then, contact a Canon representative or distributor.



#### **Do not place anything on top**

Fire or electric shock may result if water or any other liquid or a needle, paper clip or any foreign matter gets inside the CR-2.



#### **Do not use a power supply voltage other than that specified on the rating label**

#### **Do not use any power cord other than the supplied**

Use the power voltage specified on the rating label. Otherwise, fire or electric shock may result.

The supplied power cord is designed exclusively for this product. Do not use any other power cord.

# **⚠ WARNING**



## **Do not plug or unplug the power plug with wet hands**

Do not plug or unplug the power plug or handle any other parts with wet hands. Otherwise, fire or electric shock may result.



## **Unplug the plug periodically and remove any dust or dirt around the plug and the AC outlet**

If the cord is kept plugged in for a long time in a dusty, humid or sooty place, dust around the plug will attract moisture, and this may cause insulation failure which may result in a fire.



## **Insert the power plug completely**

Insert the power plug completely into the AC outlet. If a pin of the power plug makes contact with metal or any conductive object, fire or electric shock may result.



## **Do not clean the CR-2 with flammable solvent**

Before cleaning the CR-2, for safety reasons, be sure to turn off the power of all the devices and unplug the power cord from the AC outlet. Do not use alcohol, benzene, thinner or any other flammable solvent. Otherwise, fire or electric shock may result.



## **Turn off the power before inspection**

Before inspecting the instrument or cables, for safety reasons, be sure to turn off the power of all the devices. Otherwise, it may result in electric shock.



## **Do not play the supplied CD-ROM in any CD Player unsupporting data CD-ROMs**

Playing the CD-ROM in an audio CD player may damage the speaker. It is also possible to suffer hearing loss from listening with headphones to the loud sounds of the CD-ROM on an audio CD player.

# **⚠ CAUTION**



## **Do not install in locations exposed to water, steam, moisture or dust**

Doing so may cause problems or malfunctions.



## **Do not install in locations exposed to salt, sulfur or corrosive gas**

Doing so may result in corrosion of the instrument, problems or malfunctions.



## **Do not install in locations that are unstable or exposed to vibration**

The vibration may knock over the instrument or the instrument may lose its balance and fall, resulting in a malfunction or injury.



## **Do not place anything near the power plug**

To make it easy to unplug the power plug at any time you want, avoid putting any obstructions near the AC outlet.

The power plug left plugged in an emergency may result in fire or electric shock.



## **Do not block the vent holes**

Doing so may cause the internal temperature to rise and result in fire.

**⚠ CAUTION****Do not place your hands or fingers on the base**

Your hand or fingers may be pinched and injured when the stage moves to either side.

Similarly, instruct the patient not to place the patient's hands and fingers there.

**Be sure to turn off the power before moving the CR-2**

Before moving the CR-2, make sure that the power is turned off, the power plug is unplugged from the AC outlet, and any cables that are connected to other devices are disconnected.

**Do not hold the face rest or digital camera when moving the CR-2**

When carrying the CR-2, be sure to tighten the stage lock, hold the carrying indentations at the front and rear of the base panel, and keep the CR-2 level. Do not hold it by the digital camera or the face rest or any other parts, as they may come off and result in injury.

**Hold the CR-2 when connecting or disconnecting a cable**

When connecting or disconnecting the power cord or any cable, for safety reasons, be sure to hold the main unit. Otherwise, the main unit may fall over, possibly causing injury.

**Ensure that the entire system conforms to IEC 60601-1-1**

Use the computer, monitor, and other equipment that conform to the system standard IEC 60601-1 or IEC 60950-1 for the Digital Retinal Camera CR-2. Be sure that the entire system conform to IEC 60601-1-1. Be sure to also use an isolation transformer conforming to IEC 60601-1 when a computer or monitor conforming to IEC 60950-1 is used.

Otherwise, it may result in electric shock. For details, please contact a Canon representative or distributor.

**Keep the forehead rest and chin rest clean**

To prevent the risk of infection, wipe the forehead rest with ethanol solution or any other disinfectant whenever changing patients. To ensure cleanliness, replace the chin rest paper whenever the patient is changed. If the chin rest paper is not being used, be sure to disinfect the chin rest whenever the patient is changed.

For details on how to disinfect, consult a specialist. The forehead rest may be corroded if a disinfectant other than those above is used or if another disinfectant is added to ethanol. Consult a specialist in this case as well.

**Slowly move the main unit towards the patient's eye when taking an image**

When adjusting the position of the main unit in the front-back direction, slowly bring the main unit closer to the patient while looking at the patient's eye from the side. The patient's eye may be injured if the objective lens makes contact with it.

**Check the image before using the CR-2**

Before using the CR-2, be sure to take a test image to ensure that there is no foreign matter present that can affect image readings or diagnosis.

### CAUTION



#### **Be sure to turn off the power when not in use**

For safety reasons, be sure to turn off the power of all the devices when the CR-2 is not being used.

Also, unplug the power plug from the AC outlet and put on the cover when the CR-2 is not going to be used for a long time.

Otherwise, dust or any foreign matter may accumulate and result in fire.

### CAUTION



**Prohibited**

#### **Do not touch the main unit and the chin rest while they are moving**

The main unit and the chin rest move to the center position when the CR-2 main unit is turned on or a study is finished with the control software. Do not touch the main unit and the chin rest while they are moving. At the same time, keep the patient's chin away from the chin rest.



#### **Before packing the CR-2, return the main unit and chin rest to their initial positions**

Lower the main unit and chin rest to the bottom. To automatically lower them, turn on the power while holding down the set button.



#### **Inspect daily and regularly**

Before using the CR-2, for safety reasons, be sure to perform the daily inspection. Have a regular inspection performed for the CR-2 at least once a year at the representative designated by Canon.

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## Notes on Using CR-2

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### Digital camera

- The attached digital camera is designed for the CR-2. The specifications differ from commercially available Canon digital cameras, so it can be used only for observing and taking photographs of peoples' eyes. Do not use the digital camera separately detaching from the main unit or it may cause failure on the CR-2.
- If any problems with the CR-2's digital camera occur or repairs are needed, contact the Canon representative or distributor from whom you purchased the CR-2.

### Before use

- Inspect the CR-2 every day, make sure that no foreign matter is present that can affect image readings or diagnoses.
- Check and clean the objective lens before taking an image. Any stains or scratches on the objective lens will appear as white spots.
- Sudden heating of a room during winter or in cold regions may cause condensation to form on the objective lens or on optical parts inside the CR-2. In this case, wait until condensation disappears before taking images.
- Do not touch the lens part of the retinal camera or the mirror part of the digital camera when attaching and detaching the digital camera from the retinal camera. If any dirt, fingerprints, dust, or other foreign object is on the lens or mirror, you cannot take a good image.

### After use

- After using the CR-2, turn off the power, cover the objective lens with the objective lens cover to protect it from dust, and place the dust cover over the CR-2. You cannot take good images if the objective lens is dusty.
- If the digital camera is detached and left unattached, dirt and dust may enter the retinal camera and the digital camera. Be sure to always attach the caps to the respective mounts.

### Cleaning and disinfection

- Do not allow the blower to touch the lens.
- Do not wipe or rub the lens if there is dirt or dust on it. Doing so could scratch the lens.
- Do not wipe the lens with ethanol solution, eyeglass cleaner, or silicone-coated paper. Doing so could corrode the surface of the lens or leave streaks.
- Do not clean the outside of the CR-2 with lens cleaner. Doing so could damage the outside of the CR-2.
- Never use alcohol, benzine, thinner, or other solvents to clean the outside of the CR-2. Doing so damages the outside of the CR-2.
- Never use ethanol solution to clean the outside of the CR-2, except the forehead rest and the chin rest. Doing so damages the outside of the CR-2.
- If the chin rest paper is not being used, disinfect the chin rest for each patient in the same way as the forehead rest.

### Environment of use

- Use, store, and transport the CR-2 in an environment that is within the range of the following conditions.

	Temperature	Humidity	Atmospheric pressure
Environment of use	10 to 35°C	30 to 90% RH (no condensation)	800 to 1060 hPa
Storage and transportation environment	−30 to 60°C	10 to 60% RH (no condensation)	700 to 1060 hPa

- Do not install, store, or leave the CR-2 in a very hot or humid environment. Also, do not use the CR-2 outside. Doing so may cause a malfunction or misoperation.
- Always try to keep the room as clean as possible. After many years of usage, airborne dust in the room may get on the objective lens as well as the optical parts in the main unit. You cannot take good images if dust is on the equipment.
- When the CR-2 is not being used, attach the objective lens cap and place the dust cover over the CR-2.

### Installation

- Ask the Canon representative or distributor from whom you purchased the CR-2 to install it.
- A strong shock to the CR-2 may put it out of alignment. Please handle it carefully.

### Transportation

- Lower the main unit and chin rest to the bottom. To automatically lower them, turn on the power while holding down the set button.
- Be sure to turn off the CR-2's power switch, remove the AC plug from the outlet, and disconnect any cables connected to other equipment.
- Align the stage with the base, and then lock the stage with the stage lock lever.
- Carry the CR-2 by the indentations for lifting at its front and rear, and keep it level.
- Do not hold the face rest or digital camera when lifting the main unit.
- The CR-2 needs to be protected from vibration and shocks when it is transported in a vehicle or over long distances. For details, contact the Canon representative or distributor from whom you purchased the CR-2.

## Disposal

Disposal of this product in an unlawful manner may have a negative impact on health and on the environment. When disposing of this product, therefore, be absolutely sure to follow the procedure which is in conformity with the laws and regulations applicable in your area.

### European Union (and EEA\*) only



This symbol indicates that this product is not to be disposed of with your household waste, according to the WEEE Directive (2002/96/EC) and your national law. This product should be handed over to a designated collection point, e.g., on an authorized one-for-one basis when you buy a new similar product or to an authorized collection site for recycling waste electrical and electronic equipment (EEE). Improper handling of this type of waste could have a possible negative impact on the environment and human health due to potentially hazardous substances that are generally associated with EEE. At the same time, your cooperation in the correct disposal of this product will contribute to the effective usage of natural resources. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, waste authority, approved WEEE scheme or your household waste disposal service. For more information regarding return and recycling of WEEE products, please visit [www.canon-europe.com/environment](http://www.canon-europe.com/environment).

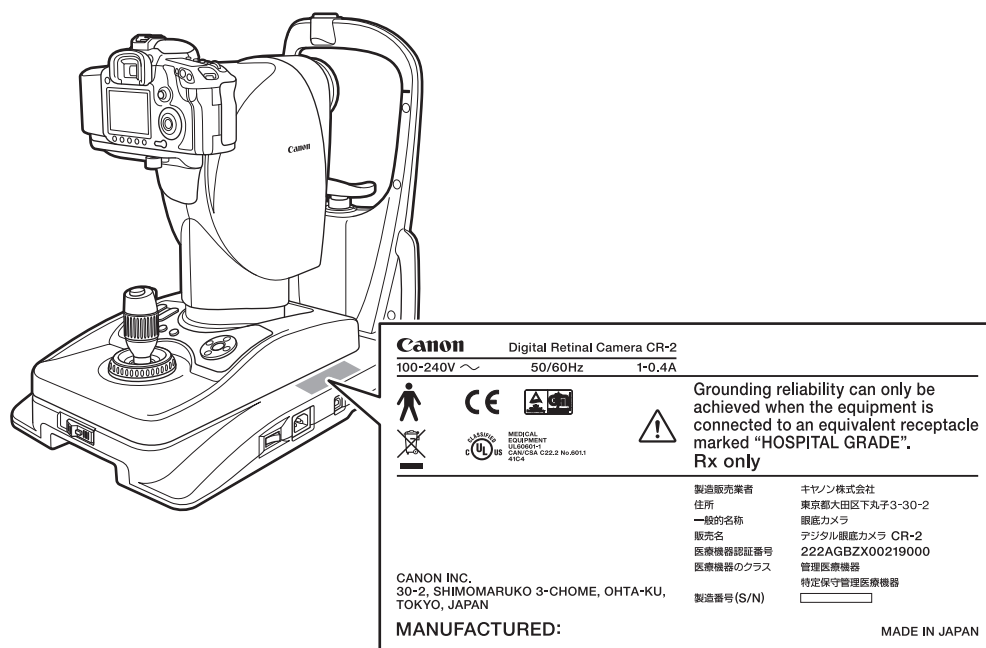
\* EEA: Norway, Iceland and Liechtenstein

### For California, USA Only

Included battery contains Perchlorate Material—Special handling may apply.  
See <http://www.dtsc.ca.gov/hazardouswaste/perchlorate/> for details.

## Rating Label Display

The position and contents of the label attached on the CR-2 is shown below.  
Follow the information on the label to use the CR-2 appropriately.



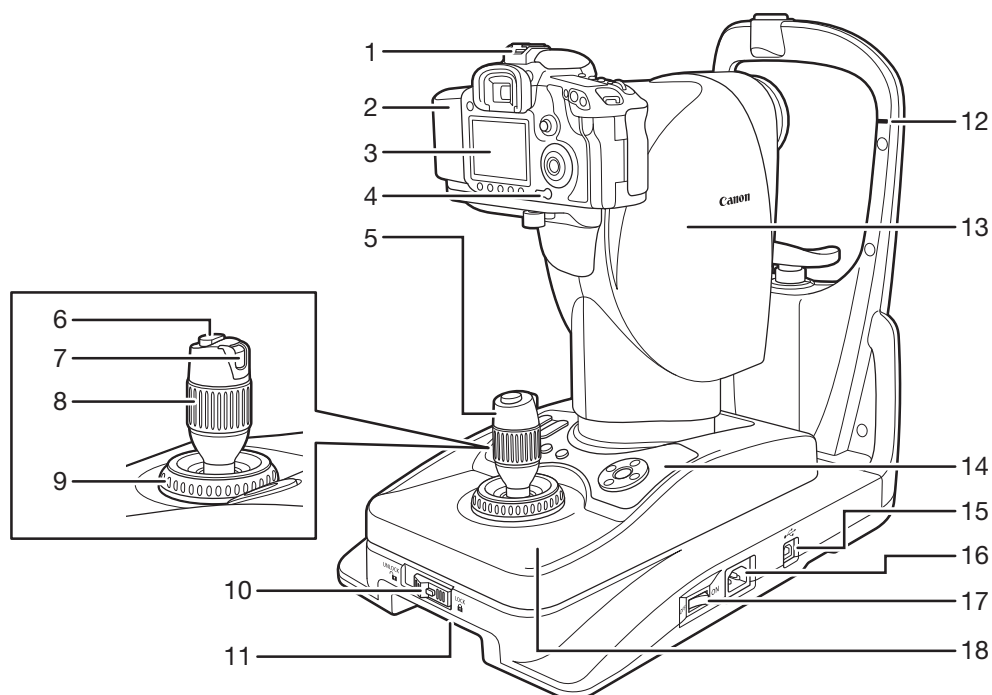
The following table describes the marks and indications on the rating label.

	Alternating current
	Type B
	Class I device indicating manufacturer's declaration of conformance with the Annex VII of the Medical Device Directive, 93/42/EEC
	Certification mark that shows the product has passed the tests by TUV Rheinland of conformity with the medical device regulations in the European Union.
	Product that WEEE directive, Directive on Waste Electrical and Electronic Equipment, 2002/96/EC, requires separate collection. The directive is effective in the European Union only.
	Certification mark that indicates the product complies with UL 60601-1 and CAN/CSA 22.2 No. 601.1, that specifies protection against fire, electric shock, and mechanical hazards
	Caution: Grounding reliability can only be achieved when the equipment is connected to an equivalent receptacle marked "HOSPITAL GRADE". This caution applies to the USA only.
<b>Rx only</b>	Caution: Federal law (USA) restricts this device to sale by or on the order of a physician.
<b>MANUFACTURED:</b>	Year and Month of Production      Example: October 2010
製造番号 (S/N)	Serial number in six digits      Example: 123456



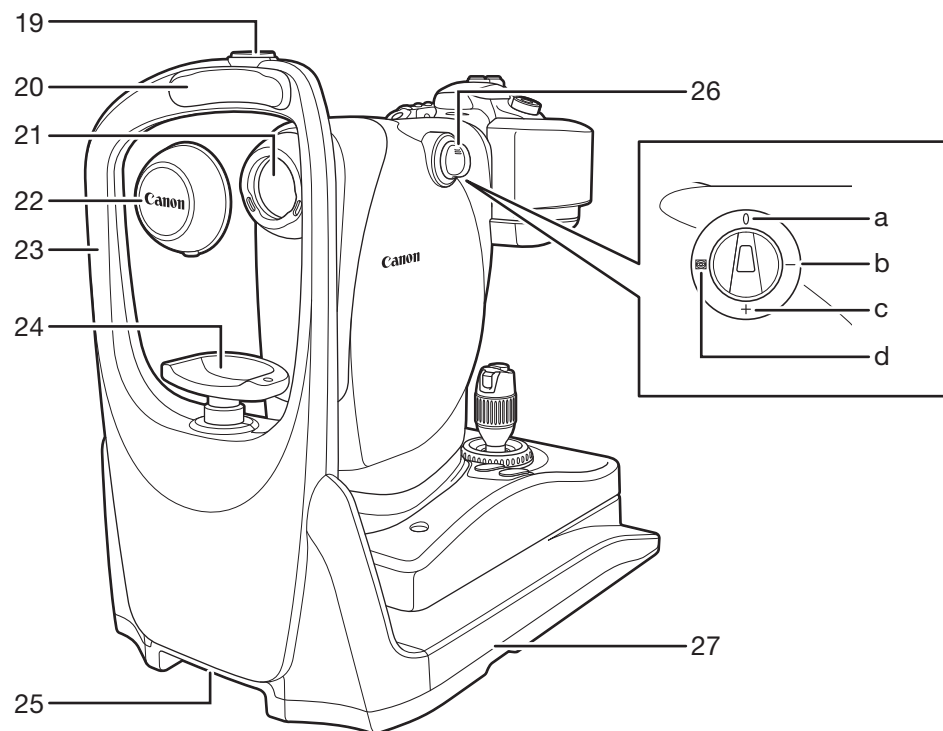
# 3 Names of Parts

## Retinal Camera



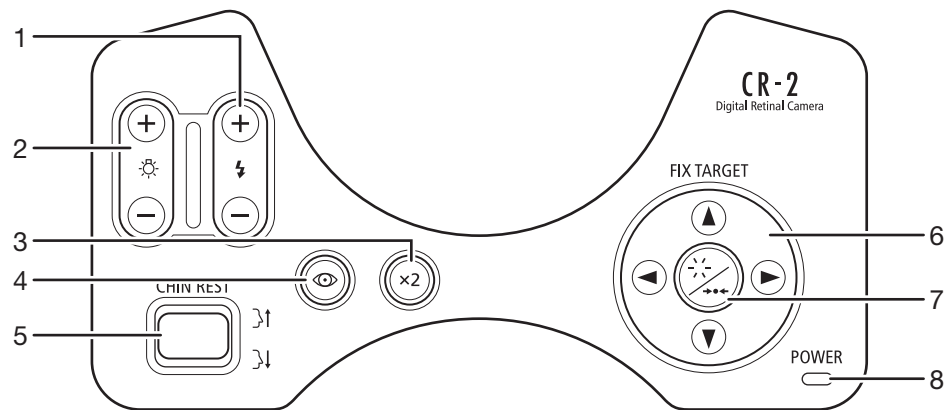
- |   |   |    |                            |
|---|---|----|----------------------------|
| 1 | Digital camera  | 9  | Focus ring                 |
| 2 | Digital camera cover  |    | Turn to focus the image.   |
| 3 | Observation monitor   | 10 | Stage lock                 |
|   | For viewing the anterior eye and retina.                    | 11 | Indentation for lifting    |
| 4 | Power switch for the digital camera                         | 12 | Height adjustment mark     |
| 5 | Operation lever   | 13 | Main unit                  |
| 6 | Shutter release button                                      | 14 | Operation panel            |
| 7 | Alignment button  | 15 | USB connector              |
|   | Switches between a view of the anterior eye and the retina. | 16 | AC power connector         |
| 8 | Main unit vertical movement ring                            | 17 | Power switch for main unit |
|   | Turn right: Main unit moves up.                             | 18 | Stage                      |
|   | Turn left: Main unit moves down.                            |    |                            |

### 3 Names of Parts



- |    |  |    |                           |
|----|--|----|---------------------------|
| 19 | Connector for external eye fixation lamp<br>(with cap)<br>Connector for the external eye fixation lamp (sold<br>separately). | 24 | Chin rest                 |
| 20 | Forehead rest  | 25 | Indentation for lifting   |
| 21 | Objective lens   | 26 | Diopter compensation knob |
| 22 | Objective lens cap   | a  | No diopter compensation   |
| 23 | Face rest  | b  | Negative compensation     |
|    |  | c  | Positive compensation     |
|    |  | d  | Anterior eye photography  |
|    |  | 27 | Base                      |

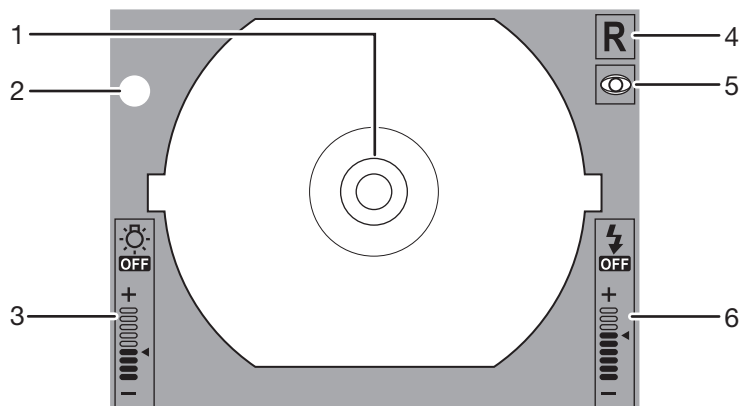
## Operation Panel



- |  |  |
|--|--|
| <p>1 Flash intensity button/lamp<br/>+: Flash intensity increases.<br/>-: Flash intensity decreases.</p> <p>2 Observation light brightness button/lamp<br/>+: Observation light brightness increases.<br/>-: Observation light brightness decreases.</p> <p>3 x2 photography button/lamp<br/>Enables x2 photography function. (See page 30)</p> <p>4 Small pupil photography button/lamp<br/>Enables small pupil photography function. (See page 30)</p> | <p>5 CHIN REST button<br/>Top: Raises chin rest.<br/>Bottom: Lowers chin rest.</p> <p>6 FIX TARGET button<br/>Move up, down, right, and left to move internal eye fixation lamp.</p> <p>7 Set button/lamp<br/>Internal eye fixation lamp blinks.</p> <p>8 POWER lamp<br/>Lights when power is turned on.</p> |
|--|--|

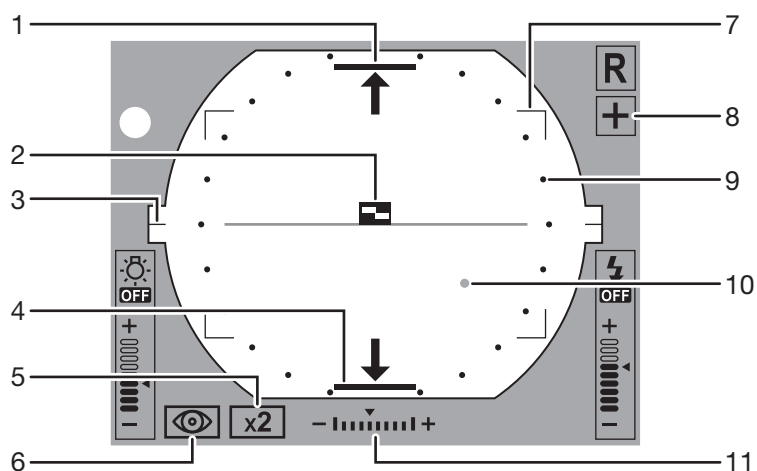
## Observation Monitor

### During anterior eye observation



- |   |  |   |  |
|---|--|---|--|
| 1 | Pupil alignment circles                | 4 | Left/right eye indicator                     |
| 2 | Photography ready lamp                 |   | R: Right eye                                 |
|   | Green: Ready to shoot                  |   | L: Left eye                                  |
|   | Red: Not ready to shoot                | 5 | Diopter compensation knob position indicator |
| 3 | Observation light brightness indicator |   | 👁: Anterior eye photography                  |
|   |  | 6 | Flash intensity indicator                    |

### During retinal observation (with x1.3 magnification)



- |   |   |    |   |
|---|---|----|---|
| 1 | Indicator for top limit of position of main unit    | 7  | x2 photography range                          |
|   | Appears when main unit has reached top limit.       | 8  | Diopter compensation knob position indicator  |
| 2 | Focus indicator                                     |    | None: No diopter compensation                 |
| 3 | WD guide (green)                                    |    | +: Positive compensation                      |
| 4 | Indicator for bottom limit of position of main unit |    | -: Negative compensation                      |
|   | Appears when main unit has reached bottom limit.    | 9  | Small pupil photography range                 |
| 5 | x2 photography indicator                            | 10 | Internal eye fixation lamp position indicator |
| 6 | Small pupil photography indicator                   | 11 | Focus lens position indicator                 |

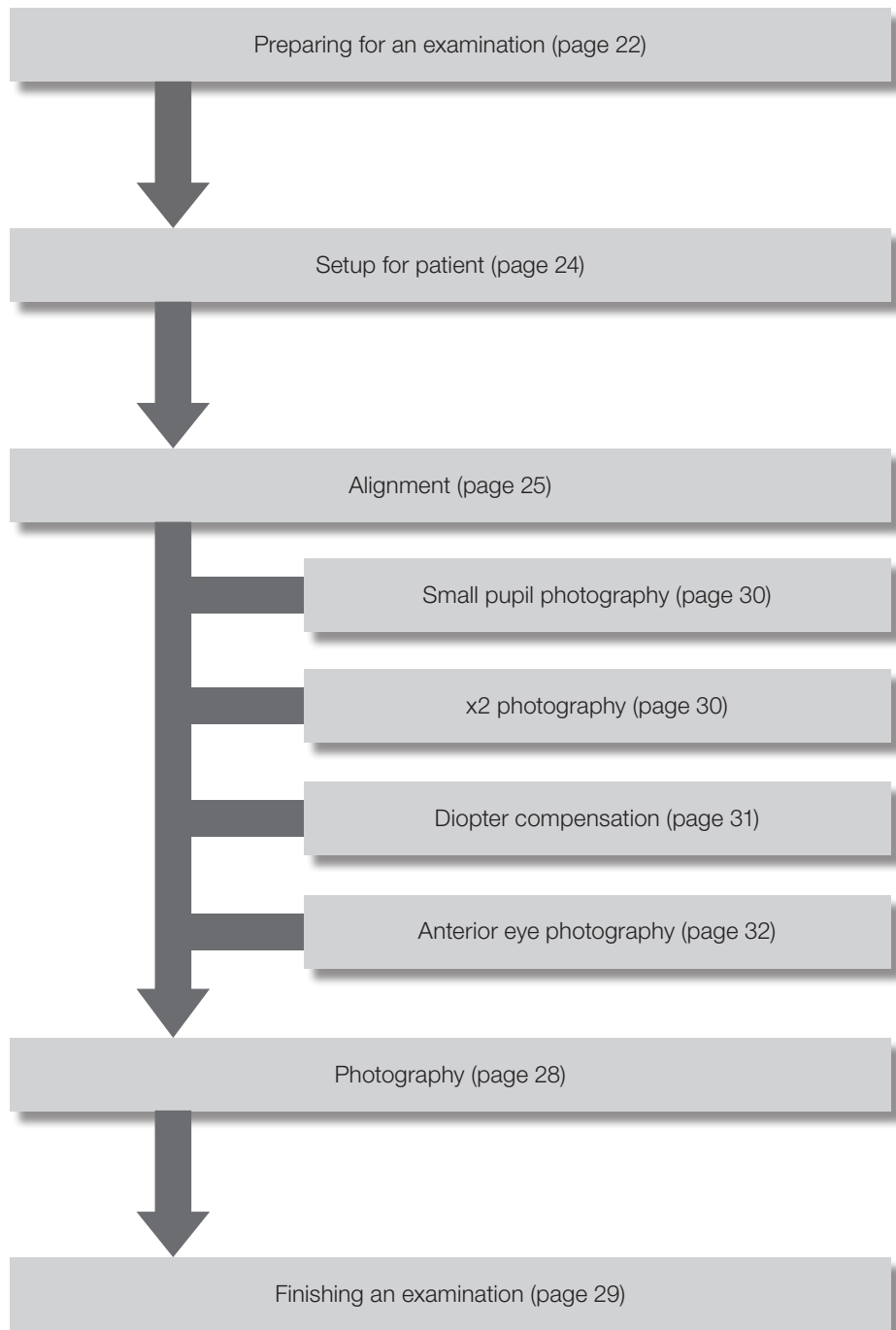
# 4 Basic Operations

## Flow of Operation

---

The flow of operations for retinal photography is as follows.

Connect the cables if necessary as described in “Connecting Cables” (see page 22).



### Connecting Cables

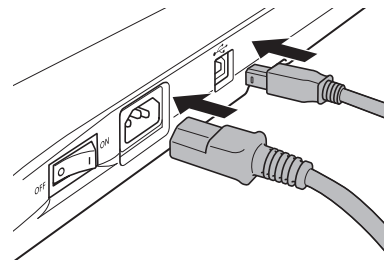
Connect the CR-2 to a computer in which the Rics NM 2, the supplied software, has been installed.

#### WARNING

- Do not plug or unplug the power plug with wet hands.
  - Do not use any power cord other than the supplied.
- Otherwise, fire or electric shock may result.

**1** Make sure that the power switch for the CR-2 is turned off.

**2** Connect the power cord and the USB cable to the retinal camera.



**3** Insert the power plug all the way into an AC outlet.

**4** Connect the other end of the USB cable to the USB connector of the PC.




Use a high-speed AB type USB cable that is 3 meters or shorter. For details, contact the Canon representative or distributor from whom you purchased the CR-2.

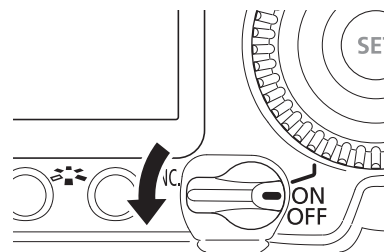
### Preparing for an Examination

#### CAUTION

- To prevent the risk of infection, wipe the forehead rest with ethanol solution or any other disinfectant whenever changing patients. For details on how to disinfect, consult a specialist.
- To ensure cleanliness, replace the chin rest paper whenever the patient is changed.

**1** Turn on the computer and start the Rics NM 2.

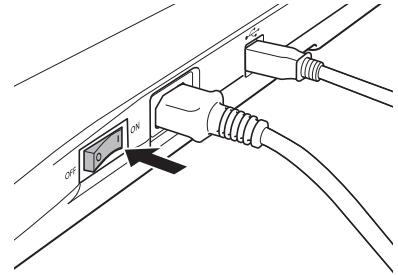
**2** If the digital camera is off, turn the switch to the ON or  position.



- 3** Remove the objective lens cap, and turn the retinal camera's power switch to the ON position.

The POWER lamp lights and the set lamp blinks.

The CR-2 automatically does an initialization sequence (internal check and initialization of driving parts). After the initialization the parts of the main unit stop in their center positions.



## CAUTION

The main unit and the chin rest move to the center position when the CR-2 is turned on. Do not touch the main unit and the chin rest while they are moving. At the same time, keep the patient's chin away from the chin rest.

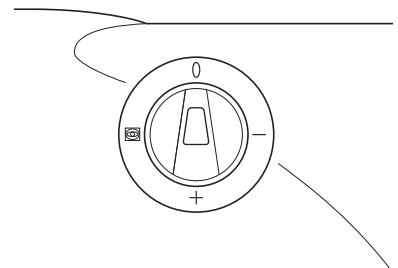


### Power-saving function

If the power is on and the buttons on the operation panel are not operated for over 10 minutes, the power-saving function is activated. The POWER lamp blinks while in power saving mode.

To return to normal mode, press any button on the operation panel, move the stage right or left, or turn the diopter compensation knob.

- 4** Make sure the diopter compensation knob is in the 0 position.

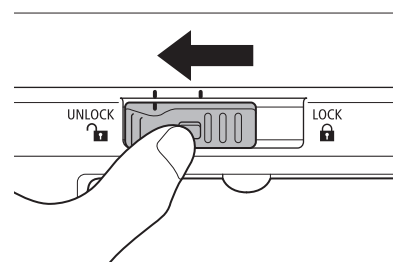


You can also check the position of the diopter compensation knob on the observation monitor.

- 5** Press and hold the unlock button and slide the stage lock to the UNLOCK side.

Align the mark on the stage lock and the mark on the left side of the base.

The stage lock is released.



- 6** Move the stage towards you with the operation lever.

### 7 Disinfect the forehead rest and replace the chin rest paper.

If chin rest paper is not being used, disinfect the chin rest also.

#### CAUTION

- To prevent the risk of infection, wipe the forehead rest with ethanol solution or any other disinfectant whenever changing patients. For details on how to disinfect, consult a specialist.
- To ensure cleanliness, replace the chin rest paper whenever the patient is changed.

## Setup for Patient

### 1 Start an examination on the Rics NM 2.

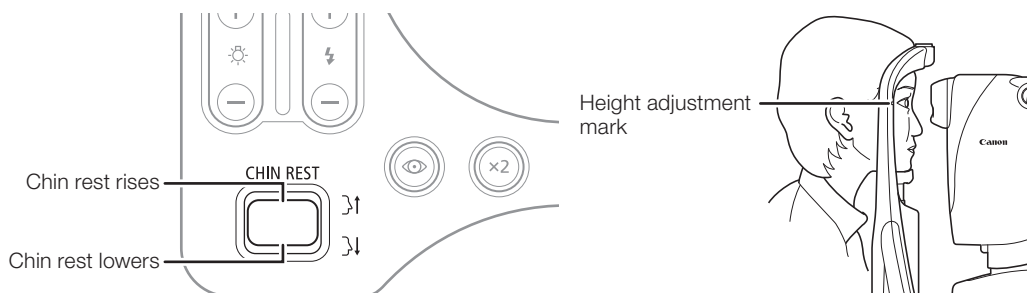
Enter the patient's information.

The set lamp lights and the observation monitor turns on.

### 2 Seat and position the patient.

- Instruct the patient to remove their contact lenses or glasses, if they are wearing them.
- Have the patient place their chin on the chin rest and their forehead against the forehead rest. Adjust the heights of the optical bench and chair so the patient is comfortable.

### 3 Move the chin rest with the CHIN REST button so that the patient's eye is aligned with the height adjustment mark.

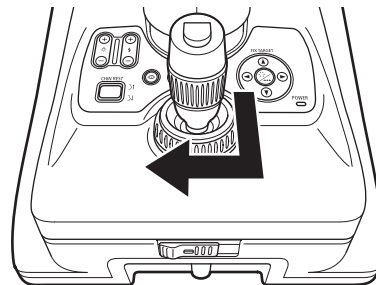


### 4 Move the stage toward the eye to be photographed.

#### CAUTION

- Do not place your hands or fingers on the base.
  - Instruct the patient not to place the patient's hands and fingers there.
- Otherwise, your or the patient's hands or fingers may be pinched, possibly resulting in injury.

Hold the operation lever, pull it toward you, and then move the stage.





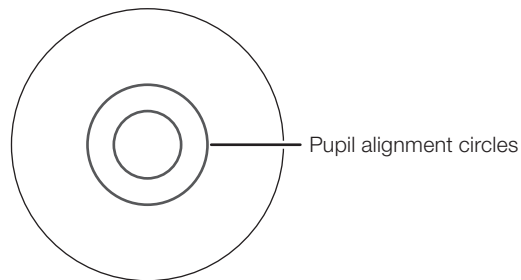
## Alignment

- 1 Align the retinal camera with the eye to be photographed.

### CAUTION

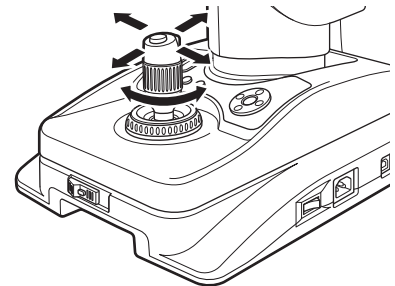
When adjusting the position of the retinal camera in the front-back direction, slowly bring the main unit closer to the patient while looking at the patient's eye from the side. The patient's eye may be injured if the objective lens makes contact with it.

1. Move the stage until the eye to be photographed appears in the observation monitor.
2. Adjust the center of the patient's pupil and the pupil alignment circles.
3. Have the patient stare at the green blinking internal eye fixation lamp.



When examining the anterior eye of a patient who is extremely near or far sighted, the patient may not be able to see the internal eye fixation lamp.

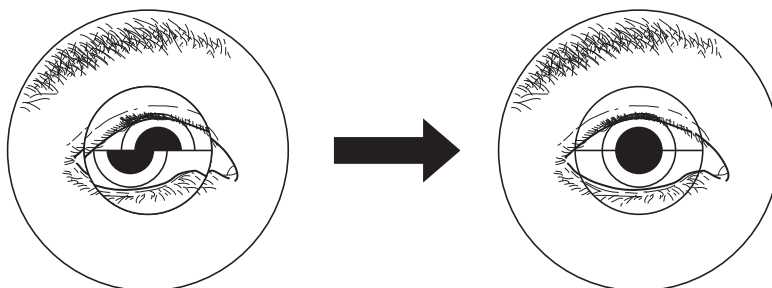
- To move the main unit slightly to the left or right, tilt the operation lever to the left or right.
- To move the main unit slightly to the front or back, tilt the operation lever to the front or back.
- To move the main unit up or down, turn the main unit vertical movement ring.



**When the vertical position cannot be fully adjusted by using the operation lever**

Adjust the height of the chin rest with the CHIN REST button to raise or lower the patient's face.

- 2 Tilt the operation lever forward or backward to unify the top and bottom of the image of the pupil.

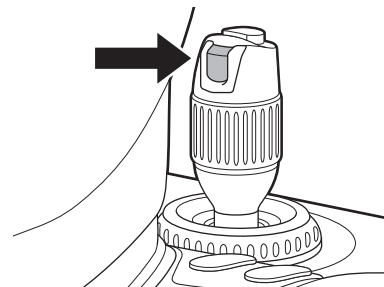


### When the pupil is smaller than the inner pupil alignment circle

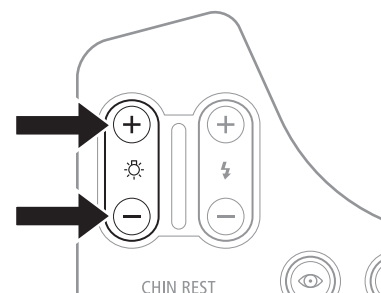
Darken the room further to dilate the patient's pupil more. If the patient's pupil does not dilate enough, use the small pupil photography function (see page 30).

- 3 Press the alignment button.

The retina appears in the observation monitor and the internal eye fixation lamp blinks for three seconds.



- 4 Adjust the observation light brightness with the observation light brightness button.



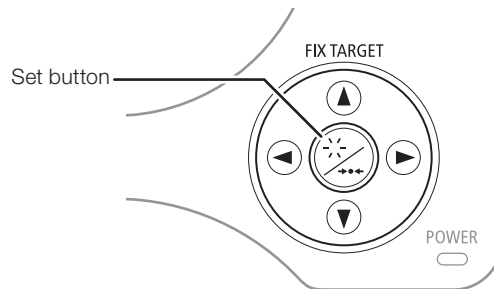
### Guidelines for observation light brightness

Adjust to the lowest possible brightness level to reduce the strain on the patient's eye.

### Observation monitor brightness adjustment

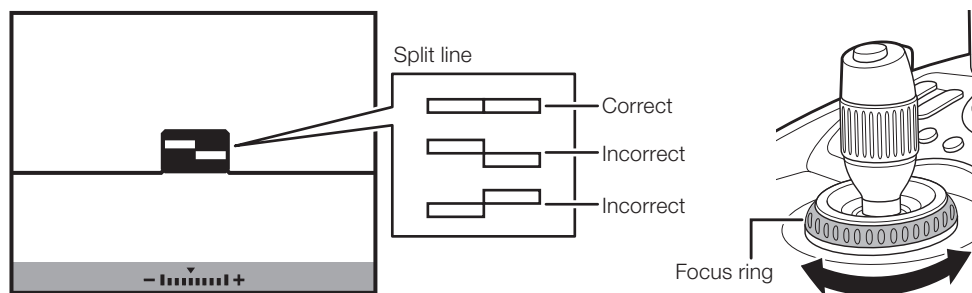
Use the Rics NM 2 to adjust the brightness of the observation monitor. See the Rics NM 2 manual for details.

- 5** Have the patient stare at the internal eye fixation lamp to fix the part for the photograph. Take the following steps to guide the patient's eye. Press the FIX TARGET buttons up, down, left, and right to move the internal eye fixation lamp to your desired position and then press the set button to make it blink. If the eye cannot be guided by the internal eye fixation lamp, use the external eye fixation lamp (sold separately).



Press the set button for over two seconds to reset the position of the internal eye fixation lamp. See the Rics NM 2 manual for details.

- 6** Turn the focus ring to align the split lines into a single line. The image enlarges while the focus ring is being turned.



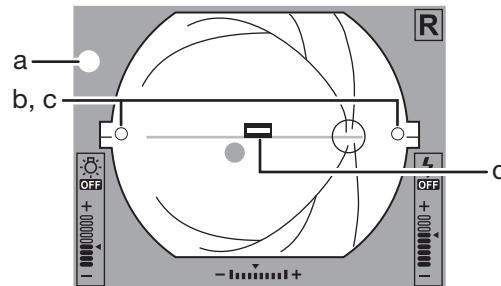
#### When the split lines do not align

If the patient's diopter range is outside the  $-10$  to  $+15$  D, it is not possible to focus with the focus indicator. If this happens, use the diopter compensation function (see page 31), and focus the image so it looks sharp.

## Photography

### 1 Do a preliminary check before taking photos.

- The photography ready lamp lights green.
- The working distance dots appear sharpest.
- The working distance dots are on the extension line of the WD guides.
- The split lines form a single line.

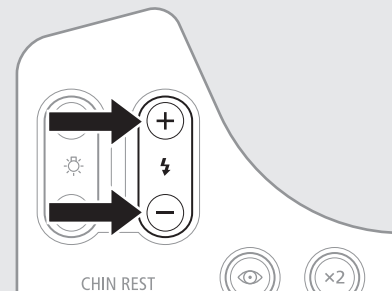


#### Photography ready lamp

- Green: Ready to shoot.
- Red: Preparing to shoot. Wait until the lamp lights green.
- None: Cannot access the Rics NM 2. The retina observation mode is not established.

#### Flash intensity adjustment

The flash intensity is set to the standard level in advance. Every time the flash intensity button is pressed the flash intensity increases by 0.3 stop.



### 2 Press the shutter release button.

The image of the retina and the examination information appear on the Rics NM 2 screen.

### 3 Check the photographed image.

Check that the image is normal and there are no errors in the examination information. To take images of the other eye, repeat steps from step 1 of Alignment (see page 25).

---

## Finishing an Examination

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- 1 Save the images on the Rics NM 2 and end the examination.

The set lamp starts blinking and the observation monitor turns off.

### CAUTION

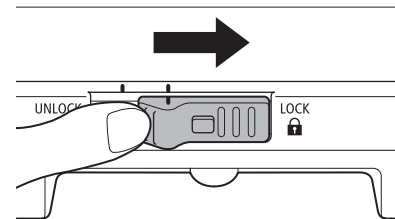
---

The main unit and the chin rest moves to the center position when a study is finished with the control software. Do not touch the main unit and the chin rest while they are moving.

---

- 2 Align the stage with the base and slide the stage lock to LOCK side to lock the stage.

Align the mark on the stage lock and the mark on the right side of the base.



- 3 Turn off the power to the CR-2.
- 4 Exit the Rics NM 2 and turn off the computer.

# 5 Photography Auxiliary Functions

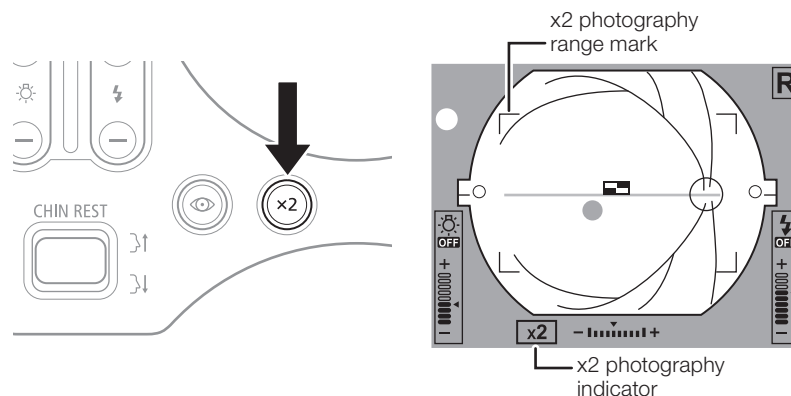
The section describes how to use x2 photography, small pupil photography function, diopter compensation, and anterior eye photography and how to connect an external monitor when one is used.

## x2 Photography

You can take and save images that are within the x2 photography range on the observation monitor.

### 1 Press the x2 photography button.

The lamp on the x2 photography button lights, and the x2 photography indicator and x2 photography range marks appear on the observation monitor.



### 2 Take the image.

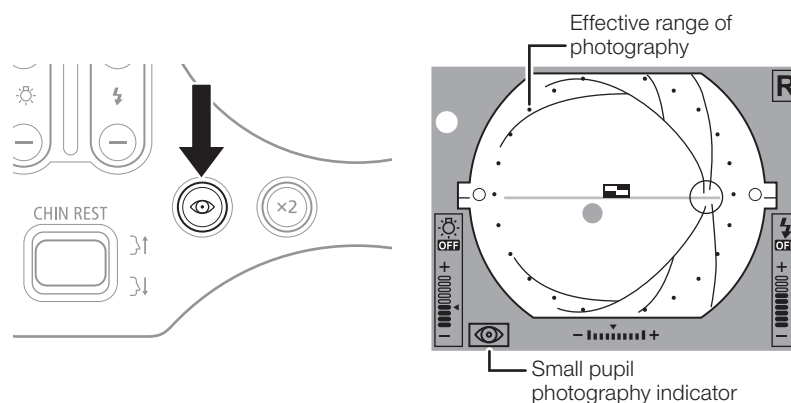
The image in the x2 photography range appears on the Rics NM 2 screen.

## Small Pupil Photography Function

If the diameter of the patient's pupil is smaller than the inner pupil alignment circle after waiting for a while in a dark room, use the small pupil photography function. When the function is used, pupil diameters 3.3 mm or larger can be photographed.

### 1 Press the small pupil photography button.

The lamp on the small pupil photography button lights, and the small pupil photography indicator and a dotted circle appear on the observation monitor.



**2 Take the image.**

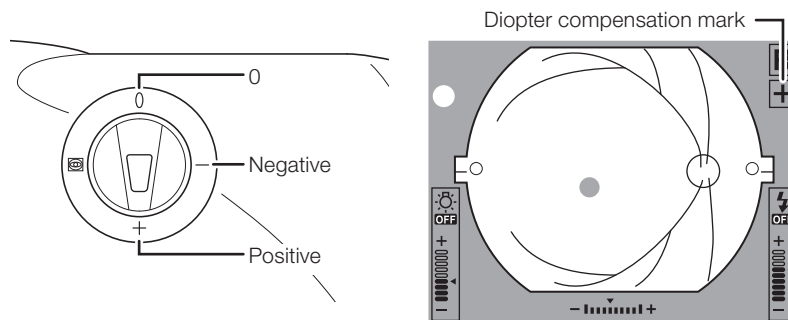
Press the small pupil photography button again to finish the small pupil photography.



- Do not use the small pupil photography function if the patient's pupil is large enough. The image will be overexposed.
- The image may contain flare around the edges of the image outside the photography range.

## Dioptr Compensation

If because of the patient's diopter the image cannot be brought into focus by turning the focus ring, use the diopter compensation knob to change the position. Insert the diopter compensation lens into the CR-2 and take the photograph.



The CR-2 can provide appropriate images if the diopter of the patient's eye fall within each range below.

- 0 position:  $-10$  to  $+15$  D
- $-$  position:  $-31$  to  $-7$  D
- $+$  position:  $+11$  to  $+33$  D

Note that when the diopter compensation knob is set to the  $-$  or  $+$  position, the focus indicator does not appear. Turn the focus ring to focus the retinal image in a position that brings the image clear on the observation monitor.



When operating the diopter compensation knob, set it precisely to the 0,  $-$ , or  $+$  position. If the knob is not aligned with the position noted above, the retinal image is not captured correctly.

### Anterior Eye Photography

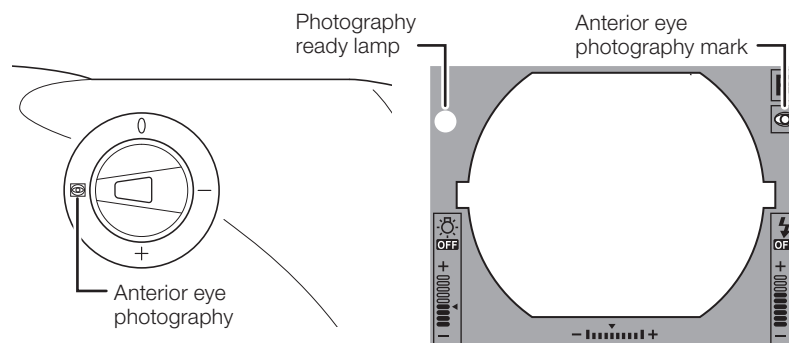
This function makes it possible to photograph the anterior eye. It is also possible to use the x2 photography function at the same time.



Do not allow external light that contains infrared to enter the position being photographed.

#### 1 Switch the diopter compensation knob to the anterior eye photography position.

The anterior eye photography mark appears on the observation monitor.



#### 2 Move the operation lever to align the area to be photographed in the center of the observation monitor.

#### 3 Tilt the operation lever to the front or back to focus on the area to be photographed.

- Focus the image so that the area to be photographed can be seen as clearly as possible.
- Make sure that the photography ready lamp lights green.

#### 4 Press the shutter release button.

The image of the retina appears on the Rics NM 2 screen.

To take images of another position, repeat steps from step 2.

### External Monitor

The image on the observation monitor can be viewed on an external monitor.

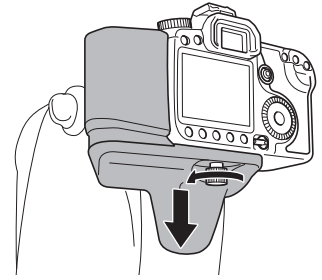
Contact the Canon representative or distributor from whom you purchased the CR-2 about which external monitors can be used.



- Before connecting or disconnecting video cables, be sure to turn off the retinal camera and all other devices.
- Use only the video cable provided with the instrument. Images might not be displayed if a different video cable is used.
- Use an external monitor that conforms to IEC60601-1 or IEC60950-1. If you use a monitor that conforms to IEC60950-1, be sure to also use the isolation transformer that is designated by Canon. For details, contact the Canon representative or distributor from whom you purchased the CR-2.

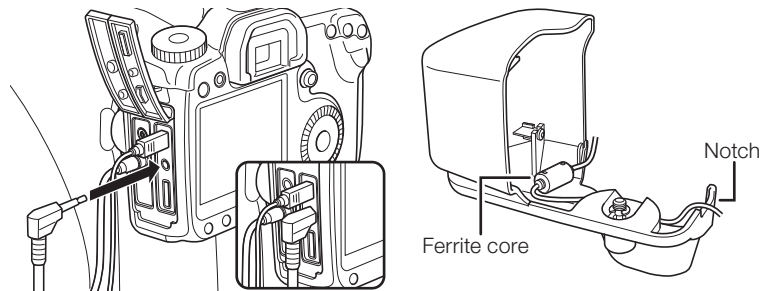


### 1 Remove the digital camera cover.



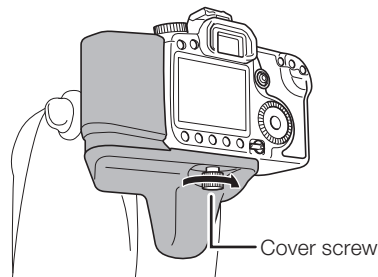
### 2 Connect the video cable to the digital camera.

1. Securely insert the supplied video cable into the VIDEO OUT terminal on the digital camera.
2. Fit the ferrite core of the video cable into the space in the cover, and place the video cable in the notch.



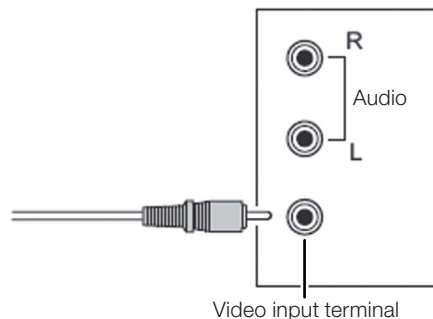
### 3 Attach the digital camera cover.

1. Hook the digital camera cover hook onto the strap mount of the digital camera.
2. While taking care to avoid pinching the video cable, insert the cover screw to secure the digital camera cover.



### 4 Connect the video cable to the external monitor.

Connect the video cable to the video input terminal (yellow) on the external monitor. Turn on the external monitor, and select the input using the monitor's input switch.



### 5 Turn on the power to the retinal camera and the digital camera.

The image is displayed on the external observation monitor. No image is displayed on the observation monitor of the retinal camera.

# 6 Maintenance

This section describes the CR-2's daily inspections, cleaning, disinfection, as well as refilling the chin rest paper, and removing and installing the digital camera.

## CAUTION

- Before using the CR-2, for safety reasons, be sure to perform the daily inspection.
- Have a regular inspection performed for the CR-2 at least once a year by the representative that is designated by Canon.

## Maintenance and Inspection

Do the following inspections before using the CR-2 to insure that it is used safely and correctly. If a problem is found during the inspection and you are unable to correct the problem, please contact the Canon representative or distributor from whom you purchased the CR-2.

### Checks before turning on the power

Check the following items before turning on the power.

#### Cables

- 1) The power cord and connection cable are not damaged and their insulation is not torn.
- 2) The power cord is fully and securely inserted into the AC connector on the main unit and the AC outlet.

#### Main unit

- 1) The digital camera cover and parts are not damaged or loose.
- 2) The stage moves smoothly when the operation lever is tilted back and forth and right to left.
- 3) The digital camera is securely installed.
- 4) The stage lock operates properly.
- 5) There are no scratches or dirt on the objective lens. Clean the objective lens if it is dirty (see page 35).

### Checks after turning on the power

Turn on the CR-2 and start the Rics NM 2. Check the following items after starting an examination.

#### Main unit

- 1) The power lamp lights.
- 2) The observation light brightness changes as the observation light brightness button is pressed.
- 3) A flash is emitted.
- 4) The main unit moves up and down smoothly as the main unit vertical movement ring is turned.
- 5) The chin rest moves up and down smoothly as the CHIN REST button is pressed.

#### Photographed image

- 1) Foreign object that affects the reading of the images or diagnosis does not appear in the photographed image. Place a piece of white paper in front of the objective lens and photograph an image under the following conditions.
  - Flash intensity: Standard
  - Diopter compensation knob: 0
  - Focus ring: Turned clockwise more than 1 rotation.

## Cleaning the Objective Lens



- Do not wipe or rub the objective lens if there is dirt or dust on it. Doing so could scratch the surface of the lens.
- Do not wipe the objective lens with disinfectant ethanol, eyeglass cleaner, or silicone-coated paper. Doing so could corrode the surface of the lens or leave streaks.

For information about lens cleaning paper, lens cleaner, and blowers, contact the Canon representative or distributor from whom you purchased the CR-2.

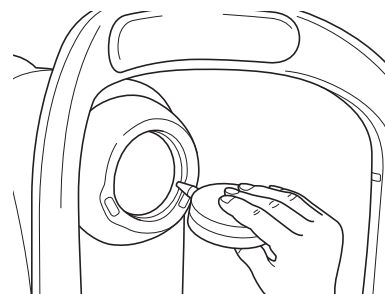
If the objective lens is dirty, clean it according to the procedure below.

### 1 Check for any dirt.

Illuminate the objective lens with a penlight to check for dirt.

### 2 Blow away any dust or dirt.

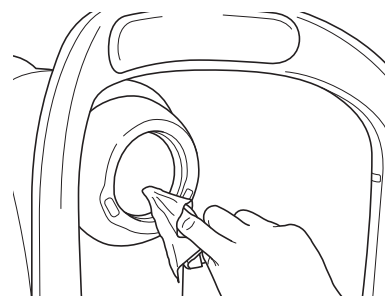
Use a blower to blow away any dust or dirt on the lens. Do not use a brush to dust off.



Do not allow the blower to touch the objective lens.

### 3 Wipe the objective lens.

1. Slightly dampen a lens cleaning paper with lens cleaner and lightly wipe the objective lens.
2. Starting from the center of the lens, wipe the lens in spirals toward the circumference.
3. Change the lens cleaning paper and wipe the objective lens until the dirt is gone and there are no streaks.




Use lens cleaning paper and lens cleaner designated by Canon.

### Cleaning the Image Sensor

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The digital camera has a self-cleaning sensor unit. Dirt and dust on the front surface of the imaging sensor are automatically removed when the power is turned on or off. This function makes it possible to remove the majority of dirt and dust that may interfere with images. It is not necessary to be aware of this function during normal usage.

To use the self-cleaning sensor unit for cleaning, follow the procedure below.

- 1** Make sure that the power switch for the retinal camera is turned off.
- 2** Switch the digital camera's power switch from on to off, or from  to off.  
The self-cleaning sensor unit starts and the imaging sensor is cleaned.
- 3** Check that the dirt and dust have been removed.
- 4** Switch the digital camera's power switch to on, photograph an image and check the image.



If the above procedure does not remove the foreign object, the cause may not be dirt or dust. Contact the Canon representative or distributor from whom you purchased the CR-2.

### Cleaning the Outside of the CR-2

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#### **WARNING**

- Before cleaning the CR-2, be sure to turn off the power of all the devices, and unplug the power cord from the AC outlet.
  - Do not use alcohol, benzine, thinner or any other flammable cleaning solvent.
- Otherwise, fire or electric shock may result.



Do not clean the outside of the CR-2 with lens cleaner. It may corrode the material of the outside of the CR-2.

If the outside of the CR-2 is dirty, wipe it twice with a soft cloth. First use a cloth that has been soaked in diluted neutral cleanser and well wrung out. Then use a cloth that has been soaked in water and well wrung out.

## Disinfecting the Forehead Rest

### CAUTION

- To prevent the risk of infection, wipe the forehead rest with ethanol solution or any other disinfectant whenever changing patients.
- The forehead rest may be corroded if a disinfectant other than those above is used or if another disinfectant is added to ethanol.

For details on how to disinfect, consult a specialist.

Use a sanitized gauze or wipe that includes disinfectant to clean the forehead rest for each patient.

## Refilling Chin Rest Paper

### CAUTION

If the chin rest paper is not being used, be sure to disinfect the chin rest whenever the patient is changed. For details on how to disinfect, see the Disinfecting Forehead Rest section.

- 1 Pull out the right and left chin rest holding pins.
- 2 Insert the holding pins into the holes on the right and left of the chin rest paper.
- 3 Attach the chin rest paper to the chin rest with the pins pressing into the holes on the chin rest.



Chin rest paper is a consumable product (sold separately). To purchase chin rest paper, contact the Canon representative or distributor from whom you purchased the CR-2.

## Attaching and Removing the Digital Camera

The CR-2 is equipped with a specialized digital camera. It is not necessary to attach or remove the digital camera during normal usage.

To replace the digital camera, follow the procedure below to remove and attach the digital camera.



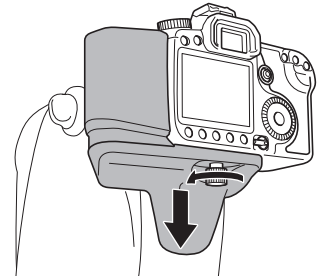
Note the following points if it is necessary to remove and attach the digital camera.

- Work quickly in a location where there is little dust.
- When removing the digital camera for storage, be sure to attach the supplied camera mount cap to the retinal camera and the body cap to the digital camera.
- Wipe off any dust from the camera mount cap and the body cap before attaching them.
- Do not touch the lens in the main unit or the mirror in the digital camera. It is not possible to take good images if dirt, fingerprints, or dust on these parts.

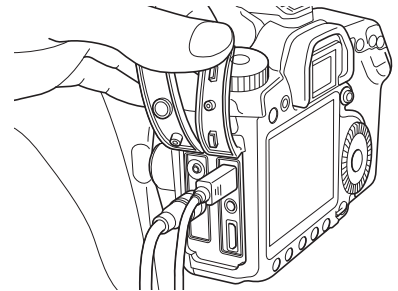
### Removing the digital camera

**1** Turn off the power to the retinal camera and remove the plug from the AC outlet.

**2** Loosen the cover screw and remove the digital camera cover.

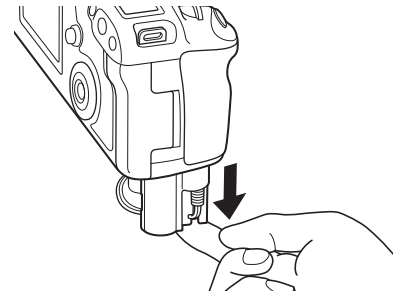


**3** Remove the cables from the digital terminal and the remote control terminal.

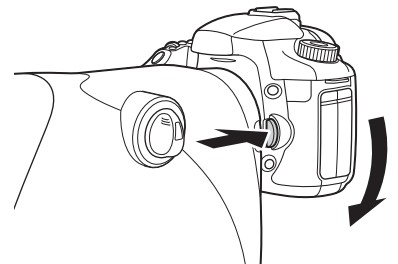


**4** Remove the DC coupler.

1. Open the battery compartment cover on the digital camera, and then slide the battery lock lever to remove the DC coupler.
2. Close the battery compartment cover.



**5** While holding down the lens release button on the digital camera, turn the digital camera counterclockwise to remove it.



**6** Attach the caps to the retinal camera and the digital camera mount.

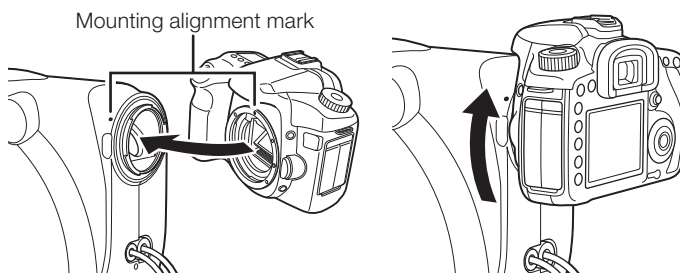
## Installing the digital camera

### 1 Make sure the following check items.

- The power to the retinal camera is off.
- The power plug of the retinal camera is not plugged into an electric outlet.

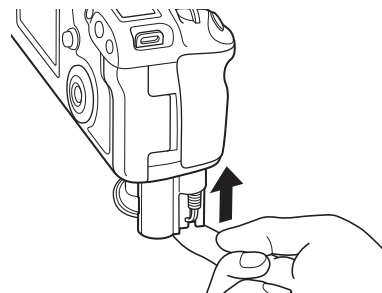
### 2 Attach the digital camera to the retinal camera.

1. Align the positions of the mounting alignment marks on the retinal camera and the digital camera.
2. Fit the digital camera's lens mount to the retinal camera's mount.
3. Turn the digital camera clockwise until it clicks.

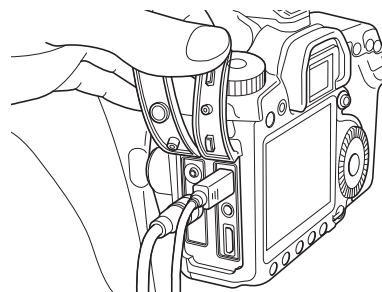


### 3 Attach the DC coupler to the digital camera.

1. Open the battery compartment cover of the digital camera, and attach the DC coupler.
2. Pass the cord for the DC coupler through the DC coupler cord hole and then close the battery compartment cover.

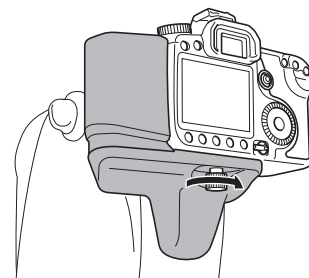


### 4 Open the terminal cover of the digital camera and attach the cables to the digital terminal and the remote control terminal.



### 5 Attach the digital camera cover to the digital camera.

1. Hook the digital camera cover hook onto the strap mount of the digital camera.
2. Insert the cover screw to secure the digital camera cover.



# 7 Troubleshooting

If any of the symptoms listed here occurs or if a warning appears in the Rics NM 2 while using the CR-2, try the relevant remedy described below.

If these remedies do not eliminate the symptoms or the warning, turn off the power and contact the Canon representative or distributor from whom you purchased the CR-2. Be ready to provide a detailed description of the symptoms and message.

Symptom	Cause and remedy
The power lamp does not light when the power is turned on.	The power cord has been disconnected. Turn off the power to the retinal camera and reconnect the power.
	The power cord has been cut. Contact the Canon representative or distributor from whom you purchased the CR-2.
A buzzer sounds (pi-pi-pi) and the operation panel lamps blink when the power is turned on.	A system error has occurred. Contact the Canon representative or distributor from whom you purchased the CR-2.
The observation monitor is dim and hard to see.	Adjust the brightness of the observation monitor. See the Rics NM 2 manual.
The observation monitor does not turn on.	Turn on the digital camera.
An error appears (Err xx) on the observation monitor.	A malfunction has been detected in the digital camera. Turn off the power to the retinal camera and then turn it on again.
The working distance dots are hard to see.	The observation light is too bright. Reduce the observation light brightness.
The split lines are hard to see.	
The working distance dots are not visible.	The retinal camera and the eye are not aligned. Align them correctly.
Flare is visible.	
The split lines are not visible.	The patient's pupil is not dilated enough. Dilate the patient's pupil. If the pupil is still too small, enable the small pupil photography function.
	Eyebrows or eyelashes are blocking the pupil. Instruct the patient to open their eye wider.
	The patient's eye is cloudy. Focusing cannot be done with the split lines.
	The diopter compensation knob is set to either negative or positive. Set it to the 0 position.
	The split line lamps are not lit.
The split lines do not align.	The diopter patient's eye is outside the range of -10 to +15 D. Use the diopter compensation function, turn the focus ring, and focus on the position where the images of the retina look clear at the same time.



Symptom	Cause and remedy
Cannot capture good images.	The patient's pupil is not dilated enough. Dilate the patient's pupil. If the pupil is still too small, enable the small pupil photography function.
	The retinal camera and the eye are not aligned. Align them correctly.
	Focus the image.
	Eyebrows or eyelashes are blocking the pupil. Instruct the patient to open their eye wider.
	The patient's eye is cloudy. Clear images cannot be captured if this is the case.
	Adjust the flash intensity, patient's diopter, and small pupil photography function.
	The objective lens is dirty. Clean the objective lens (see page 35).
	The patient is wearing contact lenses. Instruct the patient to remove their contact lenses.
Black spots or any artifacts appear in the same place in every captured image.	There is dirt or dust on the objective lens. Clean the objective lens (see page 35).
	Dirt or dust is stuck to the imaging sensor of the digital camera. Use the self-cleaning sensor unit to clean it. (see page 36).
White spots are visible on the captured image.	The objective lens is dirty. Clean the objective lens (see page 35).
	The patient's eyelashes are interfering with the image. Instruct the patient to open their eye wider, and capture another image.

# Appendix

## Specifications

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Field angle	45°
Photographic magnification	1.1 x (image size on the sensor)
Required pupil diameter	4.0 mm or greater (3.3 mm when using small pupil photography function)
Working distance	35 mm
Focus adjustment range	-10 to +15 D (without compensation lens) -31 to -7 D (when using negative compensation lens) +11 to +33 D (when using positive compensation lens) (Split-line alignment type focusing)
Flash intensity	Linked to the photography mode Can be set manually
Light source	
Observation light source	Infrared LED
Flash source	White LED
Camera	Digital camera
Eye fixation lamp	Internal eye fixation lamp (LED) External eye fixation lamp (sold separately)
Range of motion	
Stage	100 mm side to side, 70 mm front to back
Main unit vertical movement	32 mm
Chin rest range of motion	60 mm
Power supply rating	AC 100 V to 240 V, 50/60 Hz, 1 A to 0.4 A
Dimensions	305 (W) × 500 (D) × 473 (H) mm
Weight	Approximately 15 kg (including 0.8 kg digital camera)

## EMC (Electromagnetic Compatibility)

This instrument conforms to the EMC standard IEC 60601-1-2.

### Guidance and Manufacturer's Declaration for Electromagnetic Emission

The CR-2 is intended for use in the electromagnetic environment specified below.

The customer or the user of the CR-2 should assure that it is used in such an environment.

Emission Test	Compliance	Electromagnetic Environment – Guidance
RF emissions CISPR11	GROUP 1	The CR-2 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electromagnetic equipment.  The CR-2 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR11	Class B	
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

## Guidance and Manufacturer's Declaration for Electromagnetic Immunity

The CR-2 is intended for use in the electromagnetic environment specified below.

The customer or the user of the CR-2 should assure that it is used in such an environment.


Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±(2, 4, 6) kV contact ±(2, 4, 8) kV air	±(2, 4, 6) kV contact ±(2, 4, 8) kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% $U_T$ (>95% dip in $U_T$ ) for 0.5 cycles 40% $U_T$ (60% dip in $U_T$ ) for 5 cycles 70% $U_T$ (30% dip in $U_T$ ) for 25 cycles <5% $U_T$ (>95% dip in $U_T$ ) for 5 sec	<5% $U_T$ (>95% dip in $U_T$ ) for 0.5 cycles 40% $U_T$ (60% dip in $U_T$ ) for 5 cycles 70% $U_T$ (30% dip in $U_T$ ) for 25 cycles <5% $U_T$ (>95% dip in $U_T$ ) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the CR-2 requires continued operation during power mains interruptions, it is recommended that the CR-2 be powered from an uninterruptible power supply.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE:  $U_T$  is the a.c. mains voltage prior to application of the test level.

## Guidance and Manufacturer's Declaration for Electromagnetic Immunity

The CR-2 is intended for use in the electromagnetic environment specified below.

The customer or the user of the CR-2 should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	<p>Portable and mobile RF communications equipment should be used no closer to any part of the CR-2, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter</p> <p>Recommended Separation Distances</p> $d = 1.2 \sqrt{P}$ $d = 1.2 \sqrt{P} \text{ 80 MHz to 800 MHz}$ $d = 2.3 \sqrt{P} \text{ 800 MHz to 2.5 GHz}$ <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey<sup>a</sup>, should be less than the compliance level in each frequency range<sup>b</sup>.</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

- a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered.
- If the measured field strength in the location in which the CR-2 is used exceeds the applicable RF compliance level above, the CR-2 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the CR-2.
- b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

## Recommended Separation Distances between Portable and Mobile RF Communications Equipment and Devices or the CR-2

The CR-2 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the CR-2 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the CR-2 as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	Conducted RF	Radiated RF	
	150 kHz to 80 MHz $d = 1.2 \sqrt{P}$	80 MHz to 800 MHz $d = 1.2 \sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance  $d$  in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where  $P$  is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

NOTE 1: To maintain the optimum EMC performance, do not use cables other than supplied, nor extend the cable lengths more than specified.

Name	Type	Length	Remarks
AC Power Cord	Non-Shielded	3.0 m fixed-length	Supplied
USB Cable	Type AB connector plug supporting USB 2.0 Hi-Speed	Max. 3.0 m	Not supplied

NOTE 2: Do not install the CR-2 adjacent to or stacked with other electric/electronic equipment.

NOTE 3: Electromagnetic

- No unintentional raise/lower movements of Chin Rest shall occur.
- No unintentional flashing shall occur.
- No degradation of Photographic quality, which could lead erratic diagnose.
- No change in operation status, or stored data.

## Warranty and Repair Service

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### Service life

The service life of this product is eight years if specified inspections and maintenance are done.

### About repairs

If a problem cannot be solved even after taking the measures indicated in “7 Troubleshooting” (see page 40), contact the Canon representative or distributor from whom you purchased the CR-2 for repairs.

When requesting repair, please provide us with the following information.

Name of the instrument: CR-2

Serial number: 6-digit number on the rating label

Description of malfunction: Report as much detail as possible.

### Time limit for supplying performance parts for repair

Performance parts (parts for repairs to maintain performance) will be stocked for eight years after production of the CR-2 is discontinued.

### Expendable parts replaced by service personnel

The following parts are consumable or may deteriorate because of characteristics of their material or construction.

These parts cannot be replaced by the user. If these parts are found to be worn out or to have deteriorated during daily or regular inspection, contact the Canon representative or distributor from whom you purchased the CR-2 for repairs.

- Baseboard (USB connector)



\*L-IE-5176\*

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